

WHAT IS CLAIMED IS:

1           1.     A method of transmitting data packets over a synchronous wireless  
2     link comprising:  
3                 sending a headerless data packet on the synchronous wireless link, a  
4     sequential timer-based value being associated with the headerless data packet;  
5                 receiving the headerless data packet from the synchronous wireless  
6     link;  
7                 decompressing, based at least in part on the sequential timer-based  
8     value associated with the received headerless data packet, the header of the received  
9     headerless data packet;  
10                repeating at least once the steps of sending the headerless data packet,  
11     receiving, and decompressing; and  
12                sending a data packet having a header on the synchronous wireless  
13     link.

1           2.     The method of claim 1, further comprising assessing radio-bearer  
2     limitations of the synchronous wireless link.

1           3.     The method of claim 2, wherein the step of assessing further  
2     comprises determining whether a size of the payload will permit a data packet  
3     having a header to be sent on the synchronous wireless link.

1           4.     The method of claim 3, wherein the step of assessing further  
2     comprises determining a maximally-sized header that can be sent on the  
3     synchronous wireless link.

1           5.     The method of claim 3, wherein the period of sending of the data  
2     packet having the header varies in response to the step of determining whether the  
3     size of the payload will permit a data packet having a header to be sent on the  
4     synchronous wireless link.

1           6.     The method of claim 2, wherein the step of assessing is performed on  
2     a data-packet-by-data-packet basis.

1           7.     The method of claim 1, wherein the step of sending the data packet  
2     having the header is performed due to a talk spurt.

1           8.     The method of claim 7, wherein the data packet having the header  
2     comprises a compressed header.

1           9.     The method of claim 1, wherein the data packet having the header  
2     comprises a compressed header.

1           10.    The method of claim 1, wherein the method operates according to at  
2     least one of GSM/GPRS, WCDMA, cdma2000, and TDMA (IS-136).

1           11.    The method of claim 7, further comprising:  
2                   analyzing properties of a plurality of previously-sent data packets;  
3                   based on the analysis, predicting that a talk spurt is about to occur;  
4     and  
5                   wherein the step sending the data packet having the header on the  
6     synchronous wireless link is performed in response to the prediction.

1           12.    The method of claim 7, further comprising:  
2                    buffering a plurality of data packets;  
3                    examining the plurality of data packets to determine whether a talk  
4   spurt is occurring; and  
5                    wherein the step of sending the data packet having the header on the  
6   synchronous wireless link is performed in response to a determination that a talk  
7   spurt is occurring and prior to sending of a first data packet including the talk spurt.

1           13.    The method of claim 1, wherein the step of sending the data packet  
2   having the header is performed periodically.

1           14.    The method of claim 13, wherein the data packet having the header  
2   comprises a compressed header.

1           15.    The method of claim 13, wherein the step of sending the data packet  
2    having the header comprises:  
3                   determining a maximally-sized header that can be sent on the  
4    synchronous wireless link;  
5                   in response to a determination that no header can be sent, sending at  
6    least one headerless data packet; and  
7                   in response to a determination that a data packet having a header can  
8    be sent, sending a data packet having a header not exceeding the maximally-  
9    allowable size.

1           16.    The method of claim 1, wherein the step of decompressing comprises  
2    timer-based decompression of at least one dynamic part of the header of the  
3    received headerless data packet.

1           17.    The method of claim 16, wherein the at least one dynamic part  
2    comprises at least one of an RTP Sequence Number, an RTP Timestamp, and an IP-  
3    Identifier.

1           18.    The method of claim 1, wherein the step of sending the data packet  
2    having the header is performed in response to a determination that a value of a  
3    slowly-varying field in a removed header has changed from an earlier value thereof.

1           19.    The method of claim 18, wherein the data packet having the header  
2    comprises a compressed header.

1           20.    The method of claim 1, wherein the step of sending the data packet  
2    having the header is performed in response to feedback indicating that the sequential  
3    timer-based value associated with the received headerless data packet is not the  
4    sequential timer-based value expected.

1           21.    The method of claim 20, wherein the data packet having the header  
2    comprises a compressed header.

1           22.    The method of claim 1, wherein the sequential timer-based value  
2    comprises at least one of an RTP Sequence Number, an RTP Timestamp, and an  
3    Internet protocol identifier.

1           23.    The method of claim 1, further comprising removing a header from  
2   a data packet comprising a payload and the header, thereby creating a headerless  
3   data packet.

1           24.    The method of claim 1, wherein the step of decompressing comprises  
2   timer-based decompression.

1           25.    The method of claim 1, wherein the header is sent as primary traffic.

1           26.    The method of claim 1, wherein the header is sent as signaling traffic.

1           27.    The method of claim 1, wherein the header is sent as secondary  
2   traffic.

1           28.    A system for sending and receiving data packets comprising:  
2                   a first node adapted to:  
3                         send a headerless data packet toward a second node via a  
4                         synchronous wireless link, a sequential timer-based value being  
5                         associated with the headerless data packet; and  
6                         send a data packet having a header on the synchronous wireless  
7                         link; and  
8                   a second node adapted to:  
9                         receive the headerless data packet via the synchronous wireless  
10                        link; and  
11                        decompress, based at least in part on the sequential timer-based  
12                        value associated with the received headerless data packet, a header of  
13                        the received headerless data packet;  
14                        receive the data packet having the header; and  
15                        a synchronous wireless link between the first node and the  
16                        second node.



1           29.    The system of claim 28, wherein the first node is adapted to assess  
2   radio-bearer limitations of the synchronous wireless link.

1           30.    The system of claim 29, wherein the first node is adapted to determine  
2   whether a size of the payload will permit a data packet having a header to be sent  
3   by the first node on the synchronous wireless link.

1           31.    The system of claim 30, wherein the first node is adapted to determine  
2   a maximally-sized header that can be sent by the first node on the synchronous  
3   wireless link.

1           32.    The system of claim 30, wherein the period of sending of the data  
2   packet having the header varies in response to the determination by the first node  
3   whether the size of the payload will permit a data packet having a header to be sent  
4   on the synchronous wireless link.

1           33.    The system of claim 29, wherein the assessment is performed on a  
2   data-packet-by-data-packet basis.

1           34.    The system of claim 28, wherein the first node is adapted to send the  
2   data packet having the header due to a talk spurt.

1           35.    The system of claim 28, wherein the system operates according to at  
2   least one of GSM/GPRS, WCDMA, cdma2000, and TDMA (IS-136).

1           36.    The system of claim 28, wherein the data packet having the header  
2   comprises a compressed header.

1           37.    The system of claim 34, wherein the first node is further adapted to  
2                  analyze properties of a plurality of previously-sent data packets;  
3                  based on the analysis, predict that a talk spurt is about to occur; and  
4                  send the data packet having the header on the synchronous wireless  
5   link in response to the prediction.

1           38.    The system of claim 34, wherein the first node is further adapted to:  
2                    buffer a plurality of data packets;  
3                    examine the plurality of data packets to determine whether a talk spurt  
4           is occurring; and  
5                    send the data packet having the header on the synchronous wireless  
6           link in response to a determination by the first node that a talk spurt is occurring and  
7           prior to sending by the first node of a first data packet including the talk spurt.

1           39.    The system of claim 28, wherein the data packet having the header is  
2           sent periodically.

1           40.    The system of claim 29, wherein the first node is further adapted to:  
2                    determine a maximally-sized header that can be sent on the  
3           synchronous wireless link;  
4                    in response to a determination that no header can be sent, send at least  
5           one headerless data packet; and

6                   in response to a determination that a data packet having a header can  
7   be sent, send a data packet having a header not exceeding the maximally-allowable  
8   size.

1           41.    The system of claim 29, wherein the data packet having the header  
2   comprises a compressed header.

1           42.    The system of claim 28, wherein the first node comprises a base  
2   station adapted to operate according to global system for mobile communications  
3   (GSM) enhanced data for GSM evolution (EDGE).

1           43.    The system of claim 42, wherein the second node comprises a mobile  
2   station adapted to operate according to EDGE.

1           44.    The system of claim 28, wherein the first node comprises a base  
2   station adapted to operate according to time-division-multiple access (TDMA).

1           45.    The system of claim 44, wherein the second node comprises a mobile  
2   station adapted to operate according to TDMA.

1           46.    The system of claim 28, wherein the decompression comprises timer-  
2   based decompression of at least one dynamic part of the header of the received  
3   headerless data packet.

1           47.    The system of claim 46, wherein the at least one dynamic part  
2   comprises at least one of an RTP Sequence Number, an RTP Timestamp, and an IP-  
3   Identifier.

1           48.    The system of claim 28, wherein a connection between the first node  
2   and the second node is a PPP-free connection.

1           49.    The system of claim 48, wherein the PPP-free connection permits  
2   establishment of a second R-P session connected to a null-RLP over the  
3   synchronous wireless link.

1           50.    The system of claim 28, wherein the first node comprises a mobile  
2   station adapted to operate according to cdma2000.

1           51.    The system of claim 28, wherein the second node comprises a mobile  
2   station adapted to operate according to cdma2000.

1           52.    The system of claim 28, wherein the first node comprises a packet  
2   data service node (PDSN) adapted to operate according to cdma2000.

1           53.    The system of claim 28, wherein the second node comprises a packet  
2   data service node (PDSN) adapted to operate according to cdma2000.

1           54.    The system of claim 28, wherein the first node comprises a base  
2   station adapted to operate according to cdma2000.

1           55.    The system of claim 28, wherein the second node comprises a base  
2   station adapted to operate according to cdma2000.

1           56.    The system of claim 28, wherein the sequential timer-based value  
2    comprises at least one of an RTP Sequence Number, an RTP Timestamp, and an  
3    Internet protocol identifier.

1           57.    The system of claim 28, wherein the decompression comprises timer-  
2    based decompression.

1           58.    The system of claim 28, wherein the first node is further adapted to  
2    remove a header from a data packet comprising a payload and the header, thereby  
3    creating a headerless data packet.

1           59.    The system of claim 28, wherein the second node comprises a base  
2    station.

1           60.    The system of claim 28, wherein the first node comprises a mobile  
2    station.

1           61.    The system of claim 28, wherein the first node is adapted to send the  
2   data packet having the header in response to a determination that a value of a  
3   slowly-varying field in a removed header has changed from an earlier value thereof.

1           62.    The system of claim 61, wherein the data packet having the header  
2   comprises a compressed header.

3           63.    The system of claim 28, wherein the first node is adapted to send the  
4   data packet having the header in response to feedback from the second node  
5   indicating that the sequential timer-based value associated with the received  
6   headerless data packet is not the sequential timer-based value expected by the  
7   second node.

1           64.    The system of claim 28, wherein the header is sent as primary traffic.

1           65.    The system of claim 28, wherein the header is sent as secondary  
2   traffic.

1           66.    The system of claim 28, wherein the header is sent as signaling traffic.



- 1           67.    The system of claim 63, wherein the data packet having the header  
2    comprises a compressed header.

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1           68.    A node in a wireless communication system, the node comprising:  
2                   a transmitter adapted to:  
3                        send a first headerless data packet via a synchronous wireless  
4                        link, a sequential timer-based value being associated with the  
5                        headerless data packet; and  
6                        send a first data packet having a header on the synchronous  
7                        wireless link;  
8                   a receiver adapted to:  
9                        receive a second headerless data packet via the synchronous  
10                      wireless link; and  
11                      receive a second data packet having a header; and  
12                      a decompressor adapted to decompress, based at least in part on the  
13                      sequential timer-based value associated with the first headerless data packet, the  
14                      header of the first headerless data packet.

1           69.    The node of claim 68, wherein the node is adapted to determine  
2                   whether a size of the payload will permit the first data packet having a header to be  
3                   sent by the node on the synchronous wireless link.

1           70.    The node of claim 69, wherein the node is adapted to determine a  
2   maximally-sized header that can be sent by the node on the synchronous wireless  
3   link.

1           71.    The node of claim 69, wherein the period of sending of the first data  
2   packet having the header varies in response to the determination by the node  
3   whether the size of the payload will permit a data packet having a header to be sent  
4   on the synchronous wireless link.

1           72.    The node of claim 68, wherein the node is adapted to periodically  
2   send the first data packet having a header.

1           73.    The node of claim 68, wherein the node operates according to at least  
2   one of GSM/GPRS, WCDMA, cdma2000, and TDMA (IS-136).

1           74.    The node of claim 68, wherein at least one of the first data packet  
2   having a header and the second data packet having a header is sent due to a talk  
3   spurt.

1           75.    The node of claim 68, wherein the first data packet having the header  
2   is sent in response to feedback indicating that the sequential timer-based value is not  
3   an expected sequential timer-based value.

1           76.    The node of claim 68, wherein the first data packet having the header  
2   is sent in response to a determination that a value of a slowly-varying field has  
3   changed from an earlier value thereof.

1           77.    The node of claim 68, wherein the second data packet having a header  
2   comprises a compressed header.

1           78.    The node of claim 68, further comprising a compressor adapted to  
2   remove a header from a data packet comprising a payload and the header, thereby  
3   creating the first headerless data packet.

1           79.    The node of claim 68, wherein the sequential timer-based value  
2    comprises at least one of an RTP Timestamp, an RTP Sequence Number, and an  
3    Internet protocol identifier.

1           80.    The node of claim 68, wherein the header is sent as primary traffic.

1           81.    The node of claim 68, wherein the header is sent as secondary traffic.

1           82.    The node of claim 68, wherein the header is sent as signaling traffic.

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1           83.    A method of transmitting a header update comprising:  
2                   checking a packet payload size;  
3                   determining whether the packet payload size permits transmission of  
4   a header with the packet;  
5                   in response to a determination that the packet payload size permits  
6   transmission of a header with the packet, transmitting a header with the packet;  
7                   in response to a determination that the packet payload size does not  
8   permit transmission of a header with the packet, transmitting a headerless data  
9   packet.

1           84.    The method of claim 83, wherein the step of checking is performed  
2   in response to expiration of at least one of a timer and a packet counter.

1           85.    The method of claim 84, wherein at least one of the timer and the  
2   packet counter is reset and started in response to transmission of a headerless data  
3   packet.

1           86.    The method of claim 83, further comprising the steps of:  
2                   determining whether the packet payload size of the subsequent packet  
3   permits transmission of a header with the subsequent packet;  
4                   in response to a determination that the packet payload size of the  
5   subsequent packet permits transmission of a header with the subsequent packet,  
6   transmitting a header with the subsequent packet;  
7                   in response to a determination that the packet payload size of the  
8   subsequent packet does not permit transmission of a header with the subsequent  
9   packet, transmitting a headerless data packet.

1           87.    The method of claim 83, wherein each of the steps of determining  
2   comprises comparing a packet payload size to a frame size.

1           88.    The method of claim 83, further comprising the step of checking a  
2   packet payload size of a subsequent packet in response to the step of transmitting  
3   the headerless data packet.

1           89.    The method of claim 83, wherein the step of determining comprises  
2    comparing the packet payload size to a frame size.

1           90.    The method of claim 83, wherein the header comprises a compressed  
2    header.

1           91.    The method of claim 83, wherein the header is sent as primary traffic.

1           92.    The method of claim 83, wherein the header is sent as secondary  
2    traffic.

1           93.    The method of claim 83, wherein the header is sent as signaling  
2    traffic.



1           94.    A method of transmitting a header update comprising:  
2                    delaying a sequence of data packets;  
3                    determining whether the delayed sequence of data packets comprises  
4           a talk spurt;  
5                    in response to a determination that the delayed sequence comprises  
6           a talk spurt, transmitting a header update prior to transmission of the delayed  
7           sequence of data packets.

1           95.    The method of claim 94, further comprising transmitting the delayed  
2           sequence of data packets.

1           96.    The method of claim 94, wherein the talk spurt comprises a plurality  
2           of data packets having a maximal payload size.

1           97.    The method of claim 94, wherein the header update comprises a  
2           compressed header.

1            98.    The method of claim 94, wherein the header update comprises primary  
2    traffic.

1            99.    The method of claim 94, wherein the header update comprises  
2    secondary traffic.

1            100.   The method of claim 94, wherein the header update comprises  
2    signaling traffic.

1           101. A method of transmitting a header update comprising:  
2                   transmitting a sequence of data packets;  
3                   determining whether at least one property of the transmitted sequence  
4 of data packets predicts a talk spurt;  
5                   in response to a determination that the at least one property of the  
6 transmitted sequence predicts a talk spurt, transmitting a header update prior to  
7 transmission of a first data packet of the predicted talk spurt.

1           102. The method of claim 101, further comprising transmitting a plurality  
2 of data packets comprising the predicted talk spurt.

1           103. The method of claim 101, wherein the predicted talk spurt comprises  
2 a plurality of data packets having a maximal payload size.

1           104. The method of claim 101, wherein the header update comprises a  
2 compressed header.

1           105. The method of claim 101, wherein the header update comprises  
2   primary traffic.

1           106. The method of claim 101, wherein the header update comprises  
2   secondary traffic.

1           107. The method of claim 101, wherein the header update comprises  
2   signaling traffic.

Accepted for filing